

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

Based on the 2006 Edition of the International Fire Code



One of the basic essentials needed to control and extinguish a structure fire is an adequate water supply. Designing the water supply for new buildings is an important part of the initial planning for new development projects whether the new building is a 1500 square foot house or a 200,000 square foot retail store.

The City of Maricopa has adopted the 2006 edition of the International Fire Code, which has minimum standard requirements for fire flow and fire hydrant locations listed in Appendix B and C. These standards are based on fire flow calculations originally developed by the Insurance Services Office (ISO). The Fire Code standard is a modified version of the ISO calculation method and it utilizes a table of fire flows to simplify the calculation procedure. This guide is intended for developers of new projects to help explain how to calculate the required fire flows for new buildings and for additions to existing buildings.

Included at the end of this guide are the text and tables from Appendix B and C of the International Fire Code, 2006 Edition. Also included is a copy of the **New Development Fire Flow Form**. This form must be completed for new developments before a Planning Clearance is approved by the Fire Department. To complete the form:

1. The developer must fill out Section A.
2. The developer then has the water provider (Global Water, Seven Ranches or Maricopa Water) complete Section B.

3. The last part of the form is completed by the developer (or by a Arizona- licensed engineer, if required).

Once the completed form is reviewed and approved by the Fire Department, we can give a Planning Clearance for the project.

DETERMINING REQUIRED FIRE FLOW FOR NEW DEVELOPMENTS

Follow these steps to determine required flows:

1. Determine the use of the buildings -- all buildings will be either:
 - One- and two-family dwellings, or
 - Buildings other than one and two-family dwellings.
- A. *For buildings that are one and two-family dwellings:*
 - For all dwellings with a **fire area** up to 3,600 square feet, the required fire flow is 1,000 gallons per minute.
 - For all dwellings with a **fire area** larger than 3,600 square feet, use Table B105.1 to determine the required flow (look under the column heading Type VB). Find the number in the column corresponding to the fire area. The fire flow is the number under the Fire Flow heading corresponding to the fire area. For example: a 4,500 square foot home would have a required fire flow of 1,750 gallons per minute.
- B. *For buildings other than one or two family dwellings:*
 - Determine the **fire area** and **type of construction** for each building. If you don't know the construction type, consult your architect.
 - Use Table B105.1 to determine the fire flow. Some examples:
 - A 25,000 square foot Type V-A building has a fire flow requirement of 2,750 gallons per minute.
 - A 10,000 square foot Type IIIB building has a fire flow requirement of 2,250 gallons per minute.
 - A 100,000 square foot Type IIB building has a fire flow of 6,750 gallons per minute.
2. *The required fire flow for a building can be reduced by two methods:*
 - A. Installing an approved fire sprinkler system:
 - For one- and two-family dwellings, the required fire flow is reduced by 50% in sprinkled buildings.
 - For buildings other than one- and two-family dwellings, the fire flow can be reduced up to 75%, **but the resulting fire flow cannot be reduced below 1,500 gallons per minute.** For example: a 50,000 square foot Type IIIB building has a fire flow of 4,750 gallons per minute. If equipped with a fire sprinkler system, the fire flow can be

reduced by up to 75% -- to 1,188 gallons per minute. But, the minimum fire flow in this case is 1,500 GPM because this is the minimum allowed by the code.

Please note the following **definitions** for the item **B** below:

Fire Flow Calculation Area (2006 IFC, B104.1): The fire flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3)

Separate Fire Flow Calculation Areas (2006 IFC, B104.2): Portions of building which are separated by fire walls **WITHOUT OPENINGS**, constructed in accordance with the International Building Code (IBC 702.1), are allowed to be considered as separate fire-flow calculation areas.

Fire Wall (per the 2006 International Building Code, 702.1): a fire-resistance rated wall having protected openings (**NO OPENINGS OF ANY KIND**, whether protected or otherwise, are allowed for **separating fire flow calculation areas**) which restricts the spread of fire and extends continuously from the foundation to or through the roof, with sufficient structural stability under fire conditions to allow collapse of construction on either side without collapse of the wall.

- B. Dividing the building into separate **fire flow calculation areas** constructed in accordance with the International Building Code.

The fire flow for each **fire flow calculation area** within the building is then calculated according to Table B105.1. For example, if a 50,000 square foot Type IIIB building is **separated** into two 25,000 square foot **fire flow calculation areas** by a fire wall, the fire flow for each area is 3,250 gallons per minute. Without the fire wall, the 50,000 square foot **fire flow calculation area** has a fire flow of 4,750 gallons per minute.

- C. For most development projects, the building with the largest fire flow determines the fire flow requirements for the entire project. For larger projects with buildings of different sizes and types of construction, the design of the water distribution system for the project may depend on the type and size of buildings in a given area.
- As a general rule, water mains supplying fire hydrants should be at least 8" in size.
 - Larger water mains may be required depending on the fire flow available at the point of connection to the existing water- distribution system.

FIRE HYDRANT LOCATIONS AND DISTRIBUTION

Project developers should refer to Appendix C of the Fire Code to determine the number and placement of fire hydrants for a given project. A few general rules apply:

1. For single family residential subdivisions:
 - Fire hydrants should be located at all major intersections. All residential lots must have a fire hydrant within 250 feet of the lot frontage as measured along the street. For smaller size lots located on a cul-de-sac, the distance to the nearest fire hydrant can be increased to 450 feet (2006 IFC, Section 508.5.1, Exceptions 1 and 2).
2. For commercial developments, refer to Table C105.1. and follow these steps, in order:
 1. Determine the fire-flow requirement
 2. Determine the required number of fire hydrants
 3. Determine the maximum spacing between hydrants
 4. Provide an approved access road so a fire truck can be located within 150 feet walking distance of all exterior portions of the building.
 5. ***Based on the required fire flow***, a fire hydrant must be within the required distance from the fire truck as shown in the right hand column from the Table. For example: if the required fire flow is 3,000 GPM, three fire hydrants are required; their average spacing cannot exceed 400 feet, and at any point along the required access road, a fire hydrant must be within 225 feet.

NOTE: *For buildings equipped with an approved fire sprinkler system, hydrant spacing can be increased as long as the distance from the nearest fire hydrant to the fire truck does not exceed 450 feet (IFC Sec 508.5.1, Exceptions 1 and 2).*

WHEN ARE LOOPED WATER LINES REQUIRED?

Looped water lines are fed from two directions in such a way that a line break at any point along the looped line does not result in shutting off the water supply. Looped lines are important in a fire situation because a water main break could result in loss of a building or group of buildings if a second source of supply is not available.

Water supply lines. Hydrants shall be on a looped (receiving water from more than one direction) water supply line of at least six inches (6") in diameter.

Exceptions:

1. One or two-family residential developments may have hydrants supplied by a dead-end water line where there are 30 or fewer dwelling units. Up to 60 dwelling units may have hydrants supplied by a dead-end water line when all units are protected by an approved residential fire sprinkler system. In any case, the Fire Chief may require such developments provide for water line connections to adjacent properties to ensure the overall water distribution system meets recognized standards.

2. Multiple-family residential developments having up to 100 dwelling units may be protected by fire hydrants supplied by a dead-end water line. Up to 200 dwelling units may be protected by fire hydrants supplied by a dead-end water line when all units are protected by an approved residential fire sprinkler system. In no case shall such developments be supplied by a dead-end line exceeding 1000 feet in length. The Fire Chief may require such developments provide for water line connections to adjacent properties to ensure the overall water distribution system meets recognized standards.

3. For commercial and industrial developments, any building not exceeding three stories or 30 feet in height may be protected by fire hydrants supplied by a dead-end water line.

4. For commercial and industrial developments, buildings or facilities having a gross building area up to 62,000 square feet may be protected by fire hydrants supplied by a dead-end water line. The gross building area may be increased to 124,000 square feet without a looped water line when all buildings are equipped with an approved automatic fire sprinkler system. In no case shall such developments be supplied by a dead-end line exceeding 1000 feet in length. The Fire Chief may require such developments to provide for water line connections to adjacent properties to ensure the overall water distribution system meets recognized standards.

5. The Fire Chief may allow a new development that would otherwise be required to provide a looped water line for required fire hydrants, to have a dead-end line as long as the development provides a means to connect to a looped system as future development occurs. The time period and conditions under which this exception is allowed shall be as determined by the Chief.

6. The Fire Chief may allow fire hydrants to be supplied by other than a looped water line when the permittee can demonstrate, to the satisfaction of the Fire Chief, that a looped system is not practicable. In such event, the Fire Chief shall make his findings in writing and shall copy such findings to the Public Works Director and the Director of Community Development. In such cases, additional fire protection may be required as determined by the chief.

The Fire Department recognizes that, for many new development projects, it is not always practical to **immediately** provide looped water lines. For example, if the new project is surrounded by undeveloped land or by areas that are already developed with no means of connecting to existing lines, dead-end lines **might** be allowed according to two basic rules:

1. If the required fire flows can be provided with dead-end lines, the looping can be delayed until either a later phase of the project is completed or until adjacent properties are developed, so that water-line extensions result in completion of the loop.
2. If the required fire flows can be provided with dead-end lines and looping the water lines is demonstrated to be impracticable, then the Fire Chief may allow the project to develop.

In all cases, if looping the water lines is the only way to provide the required fire flows, then the project will not be approved without the looping.

**City of Maricopa
Fire Department
New Development Fire Flow**

Instructions: To process the application, the developer/applicant's engineer should first fill out all items in Section A, and then deliver/mail this form to the appropriate water purveyor. Once the water supplier has signed and given the required information, deliver/mail the completed and fully signed form to the City of Maricopa Fire Department.

SECTION A

Date: _____

Project Name: _____

Project street address: _____

Assessor's Tax Parcel Number: _____

Property Owner name: _____

City or County project file #: _____

Name of Water Purveyor: _____

1. If the project includes one or more one or two-family dwelling(s):
 - a. The maximum fire area¹ for each one or two family dwelling will be _____ square feet.
 - b. All dwelling units will ☐, will not ☐ include an approved automatic sprinkler system.Comments: _____
 2. If the project includes a building other than one and two-family dwelling(s):
 - a. List the fire area and type of construction for all buildings used to determine the minimum fire flow requirements: _____
 - b. List each building that will be provided with an approved fire sprinkler system: _____
 3. List the minimum fire flow required for this project (based on Appendix B and C): _____
- Comments: _____

Note: Fire Flow Rule: The City's Fire Code sets minimum fire flows for all structures and new development. In general, for single family dwellings, at least 1000 g.p.m at 20 p.s.i. residual pressure must be continuously available at each structure. Duplex, other residential and all non-residential uses must have more fire flows in order to fight fires. Inadequate fire flows are normally due to water supply pipes that are too small or too little water pressure, or a combination of both.

Note for the Applicant/Project engineer: Refer to Appendix B and C, IFC 2006, to determine the minimum fire flow required for this project, based on the Water Purveyor's information (*i.e.*, location, looping and size of water lines; water pressure at the site, *etc.*) and the type, density and location of all structures. Base your professional judgment on the City approved utility plans and Water Provider information shown on this Form. Each time the utility plans/other information relating to treated water changes, resubmit this form just as you did the first time.

[End of Section A. Section B continues on the next page]

¹ Fire flow calculation area, 2006 IFC, B104.1, p. 393.

**City of Maricopa
Fire Department
Fire Flow Form**

SECTION B

[To be completed by the Water Supplier]

1. Circle the name of the water supplier: Global Seven Ranches Maricopa
2. List the approximate location, type and size of supply lines for this project, or attach a map with the same information:
3. List the g.p.m. at 20 p.s.i. residual pressure at the point that the development/project will be connected to the existing water system: _____.
3. Attach fire flow test data for the fire hydrants nearest to the development/project that must be used to determine available fire flow: _____
[Or: 1. attach a map or diagram with the same information, or 2. attach a map/diagram with flow modeling information.]
4. If new lines are needed (or if existing lines must be looped) to supply the required fire flows, or if more information is needed to state the available minimum gpm @ 20 psi residual pressure, please list what the applicant/developer must do or obtain: _____

Print Name and Title of Water Supplier Employee completing this Form: _____

Date _____

Note: Based on the facts and circumstances, the Fire Chief may require the applicant/developer to engage an engineer to verify/certify that the proposed water system improvements, as reflected in the approved utility plans submitted in support of the application/development, will provide the minimum fire flows to all structures in this project. If so, the engineer's signature below means that the City's Fire Flow requirements will be met by this development, if constructed as approved.

Print Name and License No. of P.E.: _____

Signature of P.E.: _____

Dated: _____

¹ There are three drinking water suppliers: Global, Seven Ranches, Maricopa.

² Address: Fire Department: 44624 W Garvey Ave, Maricopa, Az. 85239

³ International Fire Code, 2006 Edition

⁴ City Code defines engineer as one who is licensed as a P.E. by the state of Arizona

**Rural Maricopa
Fire Department
New Development Fire Flow**

Instructions: To process the application, the developer/applicant's engineer should first fill out all items in Section A, and then deliver/mail this form to the appropriate water purveyor.¹ Once the water supplier has signed and given the required information, deliver/mail the completed and fully signed form to the Fire Department, Division of Prevention, 44624 W Garvey Ave, Maricopa, Az. 85239

SECTION A

Date: _____
Project Name: _____
Project Street Address: _____
Assessor's Tax Parcel Number: _____
Property Owner Name: _____
City or County Project File #: _____
Name of Water Purveyor: _____

1. If the project includes one or more one or two-family dwelling(s):
 - a. The maximum fire area² for each one or two family dwelling will be _____ square feet.
 - b. All dwelling units will ☐, will not ☐ include an approved automatic sprinkler system.Comments: _____

2. If the project includes a building other than one and two-family dwelling(s):
 - c. List the fire area and type of construction for all buildings used to determine the minimum fire flow requirements: _____

 - d. List each building that will be provided with an approved fire sprinkler system: _____

4. List the minimum fire flow required for this project (based on Appendix B and C): _____

Comments: _____

Note: Fire Flow Rule: The County's Fire Code¹ sets minimum fire flows for all structures and new development. In general, for single family dwellings, at least 1000 gpm at 20 psi. residual pressure must be continuously available at each structure. Duplex, other residential and all non-residential uses must have more fire flow calculation area in order to fight fires. Inadequate fire flows are normally due to water supply pipes that are too small or too little water pressure, or a combination of both.

Note for the Applicant/Project engineer: Refer to Appendix B and C, IFC 2006, to determine the minimum fire flow required for this project, based on the Water Purveyor's information (*i.e.*, location, looping and size of water lines; water pressure at the site, *etc.*) and the type, density and location of all structures. Base your professional judgment on the County approved utility plans and Water Provider information shown on this form. Each time the utility plans/other information relating to treated water changes, resubmit this form just as you did the first time.

[End of Section A. Section B continues on the next page]

¹ Fire flow calculation area is defined on page 393 of the IFC 2006, Sec B104.1.

Rural Maricopa Fire Flow Form

SECTION B

[To be completed by the Water Supplier]

1. Circle the name of the water supplier: Global Seven Ranches Maricopa
2. List the approximate location, type and size of supply lines for this project, or attach a map with the same information:
3. List the g.p.m. at 20 p.s.i. residual pressure at the point that the development/project will be connected to the existing water system: _____.
3. Attach fire flow test data for the fire hydrants nearest to the development/project that must be used to determine available fire flow: _____
[Or: 1. attach a map or diagram with the same information, or 2. attach a map/diagram with flow modeling information.]
4. If new lines are needed (or if existing lines must be looped) to supply the required fire flows, or if more information is needed to state the available minimum gpm @ 20 psi residual pressure, please list what the applicant/developer must do or obtain: _____

Print Name and Title of Water Supplier Employee completing this Form:

_____ Date _____

Note: Based on the facts and circumstances, the Fire Chief may require the applicant/developer to engage an engineerⁱⁱ to verify/certify that the proposed water system improvements, as reflected in the approved utility plans submitted in support of the application/development, will provide the minimum fire flows to all structures in this project. If so, the engineer's signature below means that the County's Fire Flow requirements will be met by this development, if constructed as approved.

Print Name and License No. of P.E.:

Signature of P.E.:

Dated: _____

¹ There are three drinking water suppliers: Global Water, Seven Ranches Water, Maricopa Water.

² Address: Fire Department: 44624 W Garvey, Ave., Maricopa, Az. 85239

³ International Fire Code, 2006 Edition

⁴ City Code defines engineer as one who is licensed as a P.E. by the State of Arizona.

APPENDIX B

FIRE-FLOW REQUIREMENTS FOR BUILDINGS

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance

SECTION B 101 GENERAL

B101.1 Scope. The procedure for determining fire-flow requirements for buildings or portions of buildings hereafter constructed shall be in accordance with this appendix. This appendix does not apply to structures other than buildings.

SECTION B102 DEFINITIONS

B102.1 Definitions. For the purposes of this appendix, certain terms are defined as follows:

FIRE FLOW. The flow rate of a water supply, measured at 20 pounds per square inch (psi) (138 kPa) residential pressure, that is available for fire fighting.

SECTION B103 MODIFICATIONS

B103.1 Decreases. The fire chief is authorized to reduce the fire-flow requirements for isolated buildings or a group of buildings in rural areas or small communities where the development of full fire-flow requirements is impractical.

B103.2 Increases. The fire chief is authorized to increase the fire-flow requirements where conditions indicate an unusual susceptibility to group fires or conflagrations. An increase shall not be more than twice that required for the building under consideration.

B103.3 Areas without water supply systems. For information regarding water supplies for fire-fighting purposes in rural and suburban areas in which adequate and reliable water supply systems do not exist, the fire code official is authorized to utilize NFPA 1142 or the *International Wildland-Urban Interface Code*.

SECTION B104 FIRE-FLOW CALCULATION AREA

B104.1 General. The fire-flow calculation area shall be the total floor area of all floor levels within the exterior walls, and under the horizontal projections of the roof of a building, except as modified in Section B104.3.

B104.2 Area Separation. Portions of buildings which are separated by fire walls without openings, constructed in accordance with the *International Building Code*, are allowed to be considered as separate fire-flow calculation areas.

Exception: Fire-flow calculation area for open parking garages shall be determined by the area of the largest floor.

SECTION B105 FIRE-FLOW REQUIREMENTS FOR BUILDINGS

B105.1 One- and two-family dwellings. The minimum fire-flow requirements for one- and two-family dwellings having a fire-flow calculation area which does not exceed 3,600 square feet (344.5 m²) shall be 1,000 gallons per minute (3785.4 L/min). Fire-flow and flow duration for dwellings having a fire-flow calculation area in excess of 3,600 square feet (344.5 m²) shall not be less than that specified in Table B105.1.

Exception: A reduction in required fire flow of 50 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system.

B105.2 Buildings other than one- and two-family dwellings. The minimum fire-flow and flow duration for buildings other than one- and two-family dwellings shall be as specified in Table B105.1.

Exception: A reduction in required fire-flow of up to 75 percent, as approved, is allowed when the building is provided with an approved automatic sprinkler system installed in accordance with Section 903.3.1.1 or 903.3.1.2. The resulting fire-flow shall not be less than 1,500 gallons per minute (5678 L/min) for the prescribed duration as specified in Table B105.1.

SECTION B106 REFERENCED STANDARDS

ICC	IBC	International Building Code	B104.2 Table B105.1
ICC	IWUIC	International Wildland-Urban Interface Code	B103.3
NFPA	1142	Standard on Water Supplies for Suburban and Rural Fire Fighting	B103.3

TABLE B105.1
MINIMUM REQUIRED FIRE-FLOW AND FLOW DURATION FOR BUILDINGS^a

FIRE FLOW CALCULATION AREA (square feet)					FIRE-FLOW (gallons/minute) ^c	FLOW DURATION (hours)
Type 1A and 1B ^b	Type 11A and 11A ^b	Type IV and V-A ^b	Type IIB and IIIB ^b	Type V-B ^b		
0-22,700	0-12,700	0-8,200	0-5,900	0-3,600	1,500	2
22,701-30,200	12,701-17,000	8,201-10,900	5,901-7,900	3,601-4,800	1,750	
30,201-38,700	17,001-21,800	10,901-12,900	7,901-9,800	4,801-6,200	2,000	
38,701-48,300	21,801-24,200	12,901-17,400	9,801-12,600	6,201-7,700	2,250	
48,301-59,000	24,201-33,200	17,401-21,300	12,601-15,400	7,701-9,400	2,500	
59,001-70,900	33,201-39,700	21,301-25,500	15,401-18,400	9,401-11,300	2,750	
70,901-83,700	39,701-47,100	25,501-30,100	18,401-21,800	11,301-13,400	3,000	3
83,701-97,700	47,101-54,900	30,101-35,200	21,801-25,900	13,401-15,600	3,250	
97,701-112,700	54,901-63,400	35,201-40,600	25,901-29,300	15,601-18,000	3,500	
112,701-128,700	63,401-72,400	40,601-46,400	29,301-33,500	18,001-20,600	3,750	
128,701-145,900	72,401-82,100	46,401-52,500	33,501-37,900	20,601-23,300	4,000	4
145,901-164,200	82,101-92,400	52,501-59,100	37,901-42,700	23,301-26,300	4,250	
164,201-183,400	92,401-103,100	59,101-66,000	42,701-47,700	26,301-29,300	4,500	
183,401-203,700	103,101-114,600	66,001-73,300	47,701-53,000	29,301-32,600	4,750	
203,701-225,200	114,601-126,700	73,301-81,100	53,001-58,600	32,601-36,000	5,000	
225,201-247,700	126,701-139,400	81,101-89,200	58,601-65,400	36,001-39,600	5,250	
247,701-271,200	139,401-152,600	89,201-97,700	65,401-70,600	39,601-43,400	5,500	
271,201-295,900	152,601-166,500	97,701-106,500	70,601-77,000	43,401-47,400	5,750	
295,901-Greater	166,501-Greater	106,501-115,800	77,001-83,700	47,401-51,500	6,000	
		115,801-125,500	83,701-90,600	51,501-55,700	6,250	
		125,501-135,500	90,601-97,900	55,701-60,200	6,500	
		135,501-145,800	97,901-106,800	60,201-64,800	6,750	
		145,801-156,700	106,801-133,200	64,801-69,600	7,000	
		156,701-167,900	113,201-121,300	69,601-74,600	7,250	
		167,901-179,400	121,301-129,600	74,601-79,800	7,500	
		179,401-191,400	129,601-138,300	79,801-85,100	7,750	
		191,401-Greater	138,301-Greater	85,101-Greater	8,000	

For SI: 1 square foot = 0.0929 m²; 1 gallon per minute = 3.785 L/m; 1 pound per square inch = 6.895 kPa.

^a The minimum required fire flow shall be allowed to be reduced by 25 percent for Group R.

^b Types of construction are based on the *International Building Code*

^c Measured at 20 psi.

APPENDIX C*

FIRE HYDRANT LOCATIONS AND DISTRIBUTION

The provisions contained in this appendix are not mandatory unless specifically referenced in the adopting ordinance

SECTION C101 GENERAL

C101.1 Scope. Fire hydrants shall be provided in accordance with this appendix for the protection of buildings, or portions of buildings, hereafter constructed.

SECTION C102 LOCATION

C102.1 Fire hydrant locations. Fire hydrants shall be provided along required fire apparatus access roads and adjacent public streets.

SECTION C103 NUMBER OF FIRE HYDRANTS

C103.1 Fire hydrants available. The minimum number of fire hydrants available to a building shall not be less than that listed in Table C105.1. The number of fire hydrants available to a complex or subdivision shall not be less than that determined by spacing requirements listed in Table C105.1 when applied to fire apparatus access roads and perimeter public streets from which fire operations could be conducted.

SECTION C104 CONSIDERATION OF EXISTING FIRE HYDRANTS

C104.1 Existing fire hydrants. Existing fire hydrants on public streets are allowed to be considered as available. Existing fire hydrants on adjacent properties shall not be considered available unless fire apparatus access roads extend between properties and easements are established to prevent obstruction of such roads.

SECTION C105 DISTRIBUTION OF FIRE HYDRANTS

C105.1 Hydrant spacing. The average spacing between fire hydrants shall not exceed that listed in Table C05.1

Exception: The fire chief is authorized to accept a deficiency of up to 10 percent where existing fire hydrants provide all or a portion of the required fire hydrant service.

Regardless of the average spacing, fire hydrants shall be located such that all points on streets and access roads adjacent to a building are within the distances listed in Table C105.1.

**TABLE C105.1
NUMBER AND DISTRIBUTION OF FIRE HYDRANTS**

FIRE-FLOW REQUIREMENT (gpm)	MINIMUM NUMBER OF HYDRANTS	AVERAGE SPACING BETWEEN HYDRANTS ^{a,b,c} (feet)	MAXIMUM DISTANCE FROM ANY POINT ON STREET OR ROAD FRONTAGE TO A HYDRANT ^d
1,750 or less	1	500	250
2,000-2,250	2	450	225
2,500	3	450	225
3,000	3	400	225
3,500-4,000	4	350	210
4,500-5,000	5	300	180
5,500	6	300	180
6,000	6	250	150
6,500-7,000	7	250	150
7,500 or more	8 or more ^e	200	120

For SI: 1 foot = 304.8 mm; 1 gallon per minute = 3.785 L/m

^a Reduce by 100 feet for dead-end streets or roads.

^b Where streets are provided with median dividers which can be crossed by fire fighters pulling hose lines, or where arterial streets are provided with four or more traffic lanes and have a traffic count of more than 30,000 vehicles per day, hydrant spacing shall average 500 feet on each side of the street and be arranged on an alternating basis up to a fire-flow requirement of 7,000 gallons per minute and 400 feet for higher fire-flow requirements.

^c Where new water mains are extended along streets where hydrants are not needed for protection of structures or similar fire problems, fire hydrants shall be provided at spacing not to exceed 1,000 feet to provide for transportation hazards.

^d Reduce by 50 feet for dead-end streets or roads

^e One hydrant for each 1,000 gallons per minute or fraction thereof.